INC
JAA52651 - R.3545.A

作成承認印	配布許可印

AF-S Nikkor ED 500mm/f4D Ⅱ IF

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

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Specifications

1. Main specifications

Focal length :	500mm
Maximum aperture :	1 : 4
Lens construction :	11 elements in 9 groups (One protective glass is built in.) ED glass (G2, G3, G6)
Picture angle :	With 135 system camera 5° 00′ With IX240 system camera 4° 00′ With Nikon Digital camera D1 3° 10′
Distance scale :	∞～4.4m
Focusing :	G6～G8 Moving type
Aperture scale :	4, 5.6, 8, 11, 16, 22
Diaphragm :	Full automatic (Minimum aperture lock is possible.)
Mount :	Nikon F mount
Filters :	Rear setting type 52 mm (P=0.75mm)
Tripod socket :	360° rotary type
Dimension :	139.5mm (dia) ×402.0mm (Maximum length)
Weight :	Approx 3,430g (Including the tripod socket)

2. Function

Operation outline

AF : Automatic focus FA : Focus aid AE : Automatic exposure

Camera body \ Lens	AF	FA	AE
F5, F4, F100, F90, F90X, F80, F70D PRONEA600i, PRONEA S, D1	○	○	○
AF Cameras except the above cameras (except F3AF)	×	○	○
Others except AF	×	×	○
F3AF	×	×	×

Focus mode

M : Manual focus AF : Automatic focus FA : Focus aid

Camera body \ Focus mode		Lens mode		
		M	M／A	A
F5, F4, F100, F90, F90X, F80 F70D, PRONEA600i PRONEA S, D1	C	MF photographing (FA is available.)	Prior MF/AF photographing	AF photographing
	S			
	M	MF photographing (FA is available.)		Not usable
AF Cameras except the above cameras (except F3AF)	C	MF photographing (FA is available.)		Not usable
	S			
	M			
Others except AF		MF photographing		Not usable

MF photographing : The MF ring is rotated manually.

Prior MF/AF photographing : AF is actuated by lightly pressing the shutter release button. AF mode is changed to MF mode by rotating the MF ring manually while AF is actuated. MF mode is changed to AF mode by returning the shutter release button, and then AF is actuated by pressing the button lightly.

AF photographing : AF is actuated by lightly pressing the shutter release button.

3. Mount contacts

Contact	Contact Name	Application
A	Vcc	Power terminal of the lens CPU circuit
B	R／W1	Lens special lead/light terminal
C	CLOCK	Input of clock
D	DATA	Command input/data input and out put
E	Hot line・Pulse	Relative distance pulse output
F	Power supply for heavy load	Power supply for heavy load such as motor
G	GND for heavy load	GND for heavy load such as motor
H	Hot line・Pulse	Relative distance pulse output
I	Teleconverter CLOCK	Communication with teleconverter
J	Teleconverter DATA	Communication with teleconverter
Mount		Signal GND

＊The contacts are arranged in the order of A～J counterclockwise as viewed behind the lens (mount side).

4. Accessories

Front cap		
・Lens cap		(JXA10095)
Rear cap		
・Lens rear cap	LF-1	(JAD50101)
Teleconverter		
・Special teleconverter	TC-14E	(JAA90851)
	TC-20E	(JAA90951)
	TC-14E II	(JAA91051)
	TC-20E II	(JAA91151)
・Teleconverter	TC-14BS	(JAA90302)
	TC-301S	(JAA90203)
Case		
・Trunk case	CT-502	(JAE91203)
・Semi – soft case	CL-L2	(JAE30201)
Hood		
・Covering hood	HK-28	(JAB63101)

Not mountable products

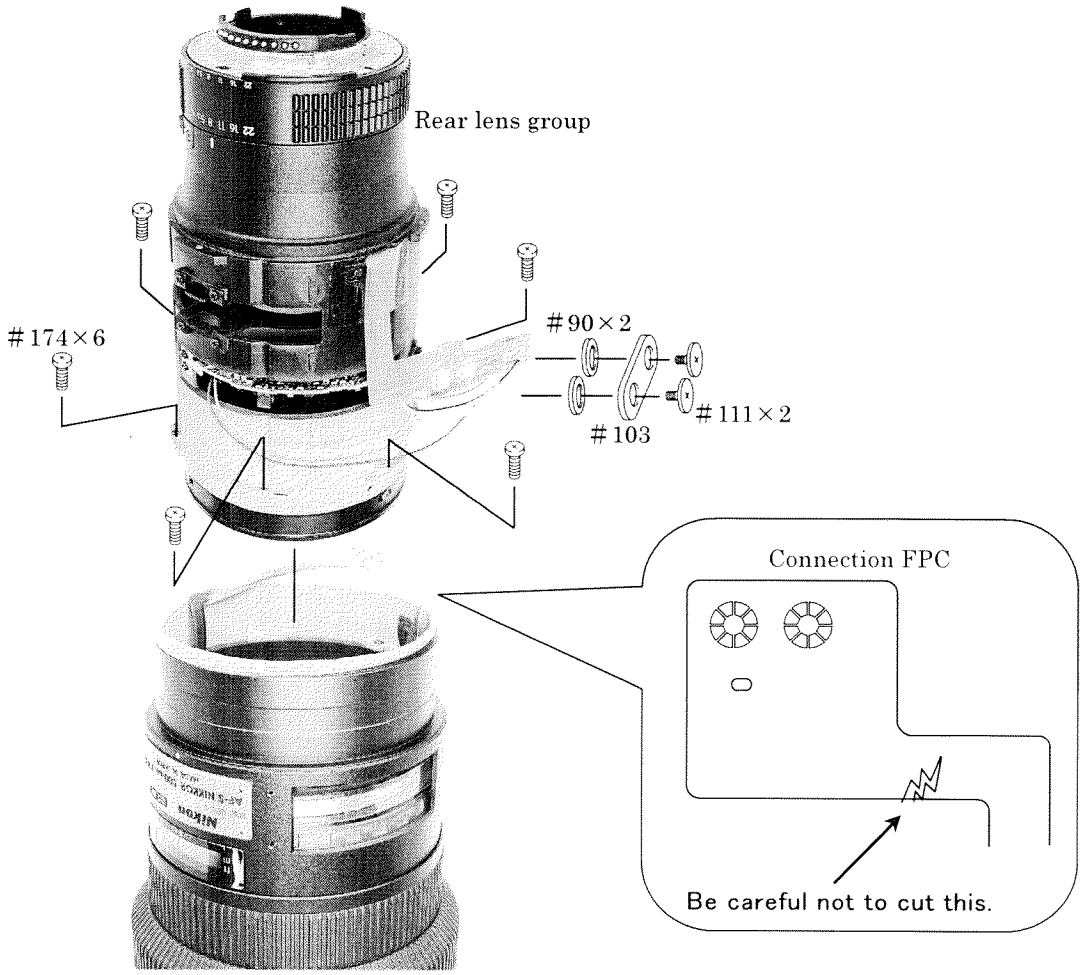
※Because of the interference of the lens mount contact part

・Automatic extension ring	PK-1	(20FA33P1)
	PK-11	(FPW00702)
	PK-11A	(FPW00703)
・K ring	K1	(20FA32K)
・Automatic ring for bellows	BR-4	(FPW00401)

DISASSEMBLING/ASSEMBLING/ADJUSTMENT

The basic construction of AF-S500/4D II (JAA52651) is the same as the present AF-S telephoto lens. As the internal parts construction except the shape and construction of the external appearance parts is the same as AF-S400/2.8D II (JAA52551), this Repair Manual indicates only the points to be attended to at disassembling and the adjustment values of which standards are different. Therefore, please refer to Repair Manual for AF-S400/2.8D II (JAA52551).

Notes: Do not cut the connection FPC when disassembling the rear lens group.



APERTURE DIAMETER ADJUSTMENT

Aperture Setting	Inscribed circle Diameter (mm)	Allowable range (mm)
4	39.50	43.51～37.31
5.6	28.31	31.78～25.22
8	19.98	22.43～17.80
11	14.02	16.35～12.02
16	9.93	11.58～ 8.50
22	7.02	8.19～ 6.02

ADJUSTMENT FOR SCANNING SPEED/INSPECTION FOR DRIVING FREQUENCY

The numerical value of scanning speed: 4.2±0.1sec(9±0.3rpm)

ADJUSTMENT AND CHECK F.F.D.(BACK FOCUS), "∞" ALIGNMENT

①Set the focus ring to "∞" and the aperture to "maximum(f4)".

②Read the M.B.f. value and check if it is within the standards.

③When the M.B.f. value is out of standard, remove the 1st, 2nd and 3rd lens group and then adjust the difference between the standard and the read value by using the washer#284 of the 3rd lens group.

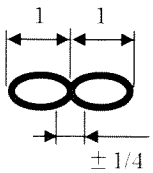
When the difference is positive : Thicken the washer.

When the difference is positive : Thin the washer.

Standard: 0±0.25mm

④When the M.B.f. value is within the standard, check the "∞" alignment with a collimater.

Standard: ±1／4 of "∞"



・If the F.F.D adjustment is impossible, adjust the "∞" alignment in the same way.

LENS OPERATION CHECK

Refer to the page L38 to L47 in the repair manual for AF-S80-200/2.8D(JAA76551) and check the operational conditions.

In addition what is displayed on PC screen is slightly different from the statements in check list.

The followings are the tolerances for standards.

(2) Image of "operation of MR encoder"

```
TYPE OF LENS : AF-S NIKKOR 500mm/4D II                CPU VERSION : 1.01.01
OPERATION OF MR ENCODER

POSITION WHEN CHECK BEGINS [PULSE (S)] ..... -67
POSITION WHEN CHECK IS ENDED [PULSE (S)] ..... -66
PULSE NUMBER DIFFERENCE BEFORE/AFTER CHECK. [PULSE (S)] ..... 1
STANDARD FOR DIFFERENCE IN NUMBER PULSE  -10 TO 10  [PULSE (S)]
                                                          IN STANDARD.
**************************************************
THE TOTAL NUMBER OF PULSE(S) AT INSPECTION [PULSE (S)] ..... 16418
STANDARD FOR THE NUMBER : 16254  TO  16604  [PULSE (S)]
                                                          IN STANDARD.



PUSH ESC KEY TO RETURN TO MENU.
```

(3) Image of "lens driving stop accuracy"

```
TYPE OF LENS : AF-S NIKKOR 500mm/4D II                CPU VERSION : 1.01.01
INSPECTION OF DRIVING STOP ACCURACY.
①→NUMBER OF LENS GO-AND-RETURN OPERATIONS.                    :      5/5 TIME(S).
  NUMBER OF LENS DRIVING TIMES (DF0+DF1+DF2+DF3+DF4+DF5+DF6)  :      533 TIME(S).
  MAXMUM PULSEABS. (VALUE) (DF0+DF1+DF2+DF3+DF4+DF5+DF6)      :        6 PULSE(S).
  OVER (OR UNDER) RUN PULSE(S).                               :        1 PULSE(S).
  LENS DRIVING TIME   :  DF1=91  DF2=90  DF3=89  DF4=87  DF5=85  DF6=81
  DIRECTION           :        INF → CLOSE          CLOSE → INF
  AMOUNT              :   DF1     DF2     DF3      DF1     DF2     DF3
  UNDER(-), OVER(+)   :  (-)(+)  (-)(+)  (-)(+)   (-)(+)  (-)(+)  (-)(+)
        0 - 11        :  26  20  33  12  43  2     8  37   1  44   0  44
       12 - 33        :   0   0   0   0   0  0     0   0   0   0   0   0
       22 - 33        :   0   0   0   0   0  0     0   0   0   0   0   0
④→     34 -          :   0   0   0   0   0  0     0   0   0   0   0   0
  DIRECTION           :        INF → CLOSE          CLOSE → INF
  AMOUNT              :   DF4     DF5     DF6      DF4     DF5     DF6
  UNDER(-), OVER(+)   :  (-)(+)  (-)(+)  (-)(+)   (-)(+)  (-)(+)  (-)(+)
        0 - 11        :  43   1  40   3  39  2     0  43   0  42   0  40
       12 - 33        :   0   0   0   0   0  0     0   0   0   0   0   0
       22 - 33        :   0   0   0   0   0  0     0   0   0   0   0   0
⑤→     34 -          :   0   0   0   0   0  0     0   0   0   0   0   0
②→   RATIO (1)  (%)   : Df1=0.00  Df2=0.00  Df3=0.00  Df4=0.00  Df5=0.00  Df6=0.00
③→   RATIO (2)  (%)   : Df1=0.00  Df2=0.00  Df3=0.00  Df4=0.00  Df5=0.00  Df6=0.00
  PUSH ESC KEY TO RETURN TO MENU.
```

Note : If the MF ring is rotated during lens scanning, an error value is shown for the pulses.
Don't touch the MF ring during operation.
The above image is displayed during lens scanning. Execute inspection for the 5 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 90° upward	
Front group 90° downward	

The pulses of overrun／underrun must be within the standards after the lenses have reciprocated five times ("5／5 TIME(S). in ① of the image").

Standards RATIO(1) is 40% or less for Df1～Df6 ——— ② of the image
(Occurrence ratio of 12～33 pulses)

RATIO(2) is 10% or less for Df1～Df6 ——— ③ of the image
(Occurrence ratio of 22～33 pulses)

Occurrence of 34 or more pulses is 0 for Df1～Df6 ——— ④ and ⑤ of the image
(It is malfunction if there is only one occurrence.)

※Df1～Df6 shown the lens driving amount.

(4) Image of "lens servo time"

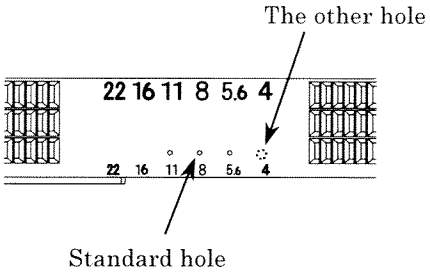
TYPE OF LENS : AF-S NIKKOR 500mm/4D II CPU VERSION : 1.01.01
INSPECTION OF LENS SERVO TIME.

SERVO AMOUNT	STANDARD
1. [Df1]	35ms OR LESS.
2. [Df2]	45ms OR LESS.
3. [Df3]	54ms OR LESS.
4. [Df4]	66ms OR LESS.
5. [Df5]	83ms OR LESS.
6. [Df6]	95ms OR LESS.

7. DRIVE TO INFINITY.
8. DRIVE TO CLOSE.

SELECT A NUMBER.
PUSH ESC KEY TO MENU.

ATTACHING METER COUPLING SHOE



①Take out diaphragm ring ＃28.
②Drill a 1.1 mm hole at dented part near F8 mark (standard) .
③Put a aperture coupling to standard hole, then drill the other hole.
④Attach meter coupling shoe.

Meter coupling shoe	1K406－029 ×1
Screw	1K010－002－1 ×2

⑤Assembling.

TOOLS

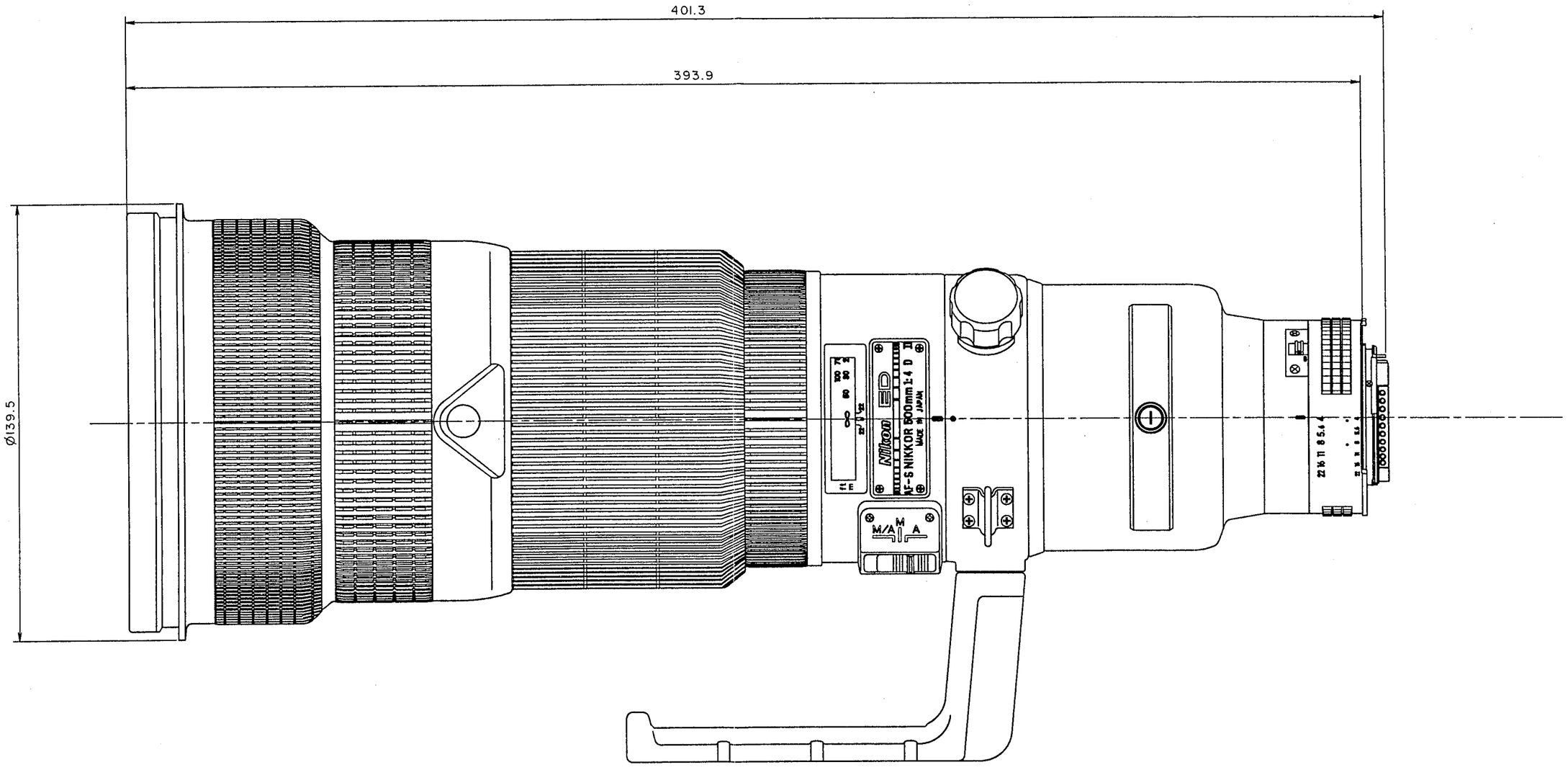
1. Measuring instruments (Main)

Tool No.	Name	Remarks
J15306	AF-I Communication box	The tool used for AF-I is used again
J15307	AF-I Communication adapter	The tool used for AF-I is used again
J15334	H8 D/A converter (F/V converter)	For adjusting the scanning speed
J15352	Communication tool	Used for inspection and adjustment for output from the MR encoder
J15353	Communication tool	For adjustment the Main FPC
J15355	Switching tool	For adjustment the Main FPC
J18323	AF-S TELE LENS Inspection and adjustment software	IBM 3.5-inch

2. Hand-made tool

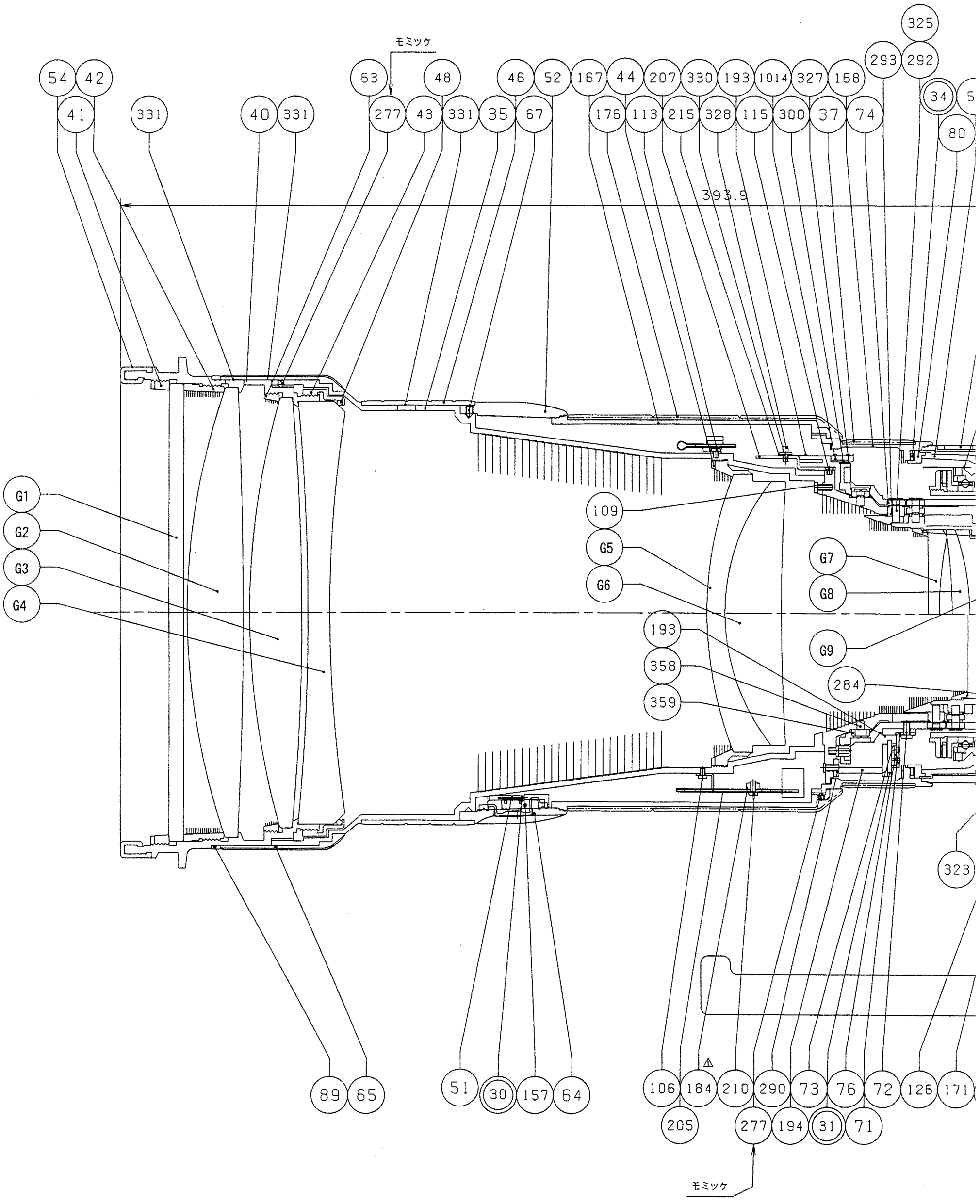
	Name	Remarks
Tool	SWM rotation actuating tool	The tool used for AF-S 300/2.8 is used again

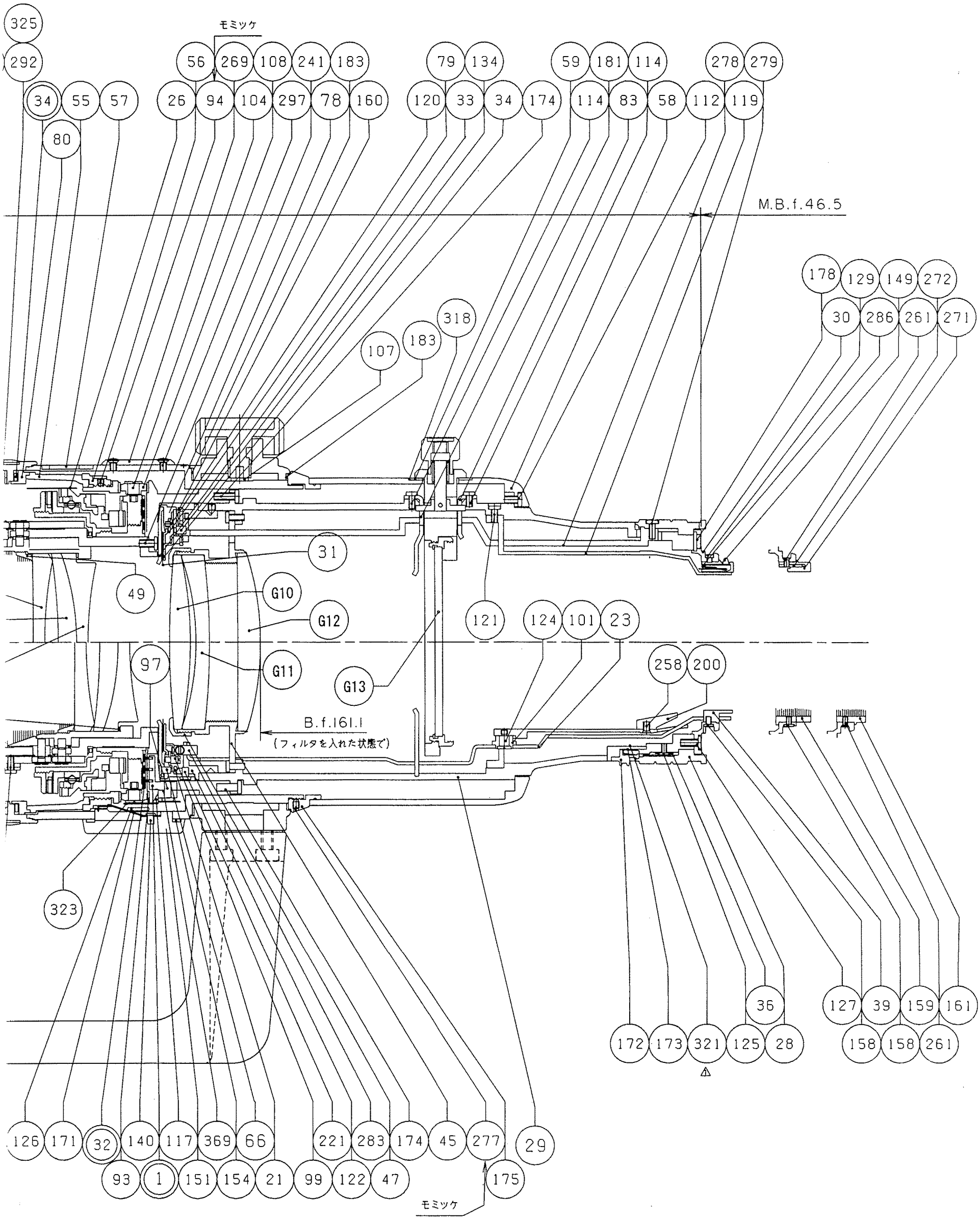
外観図 Sketch drawings



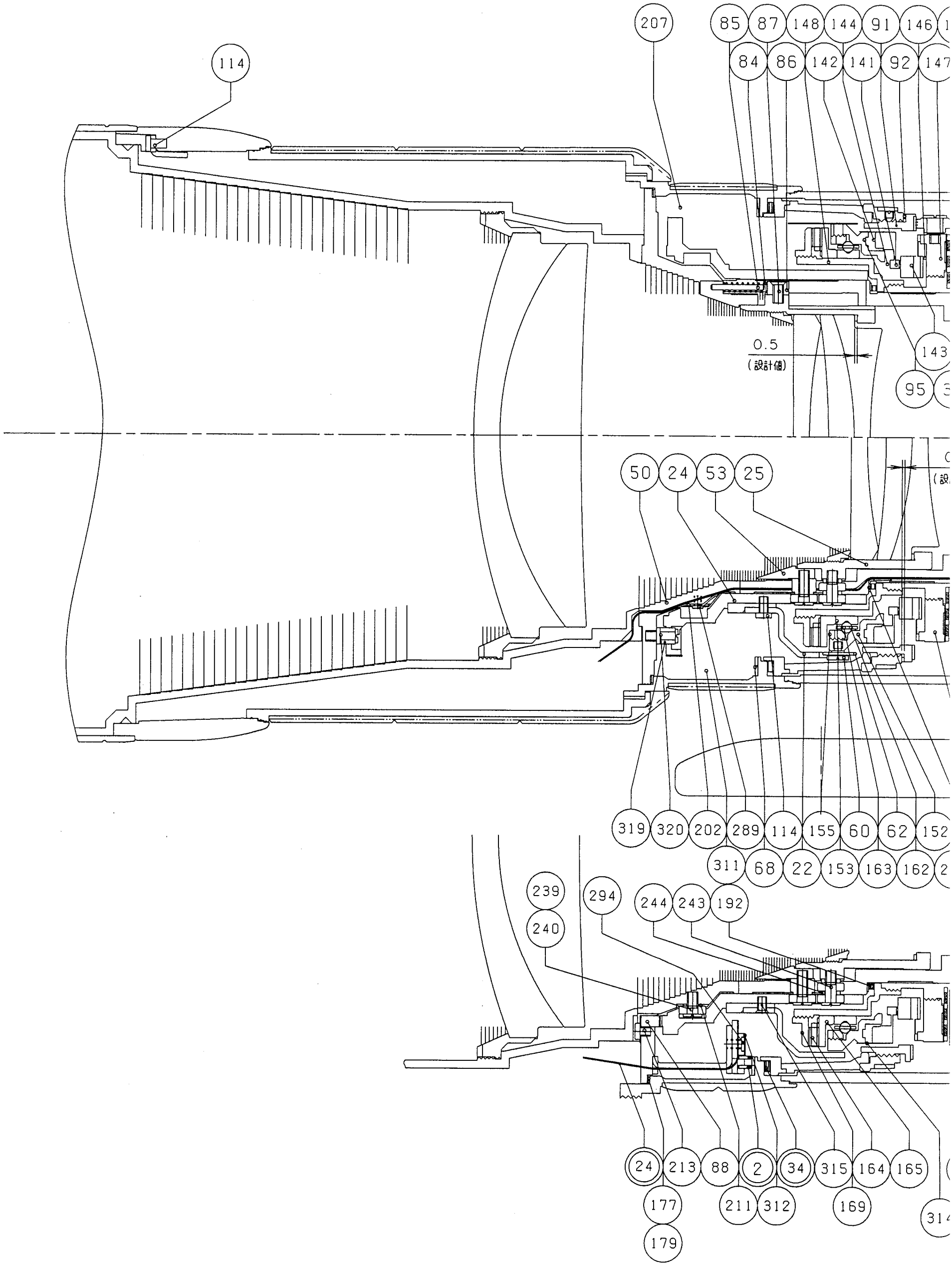
INC

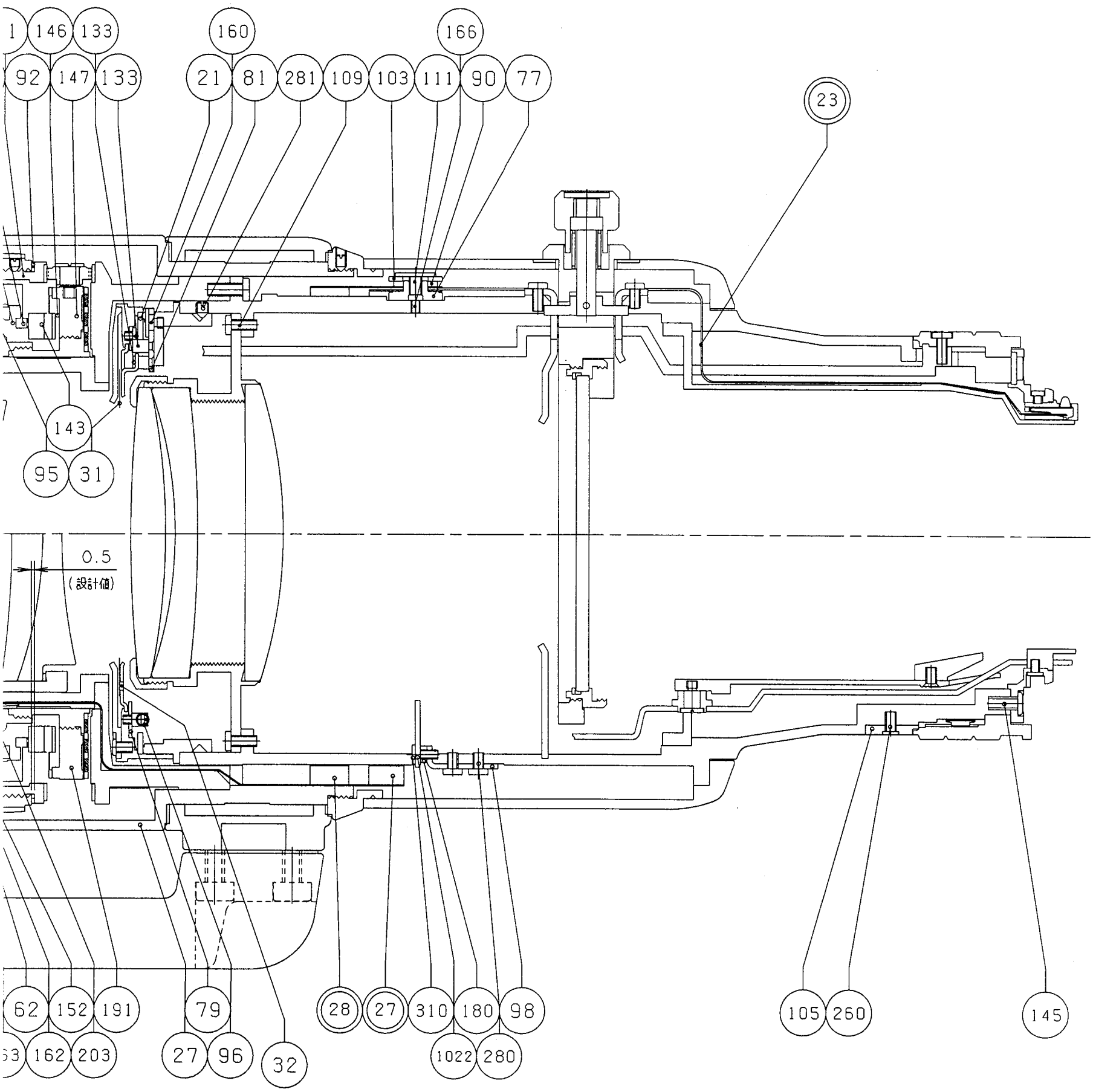
組立図 Structure of the Lens

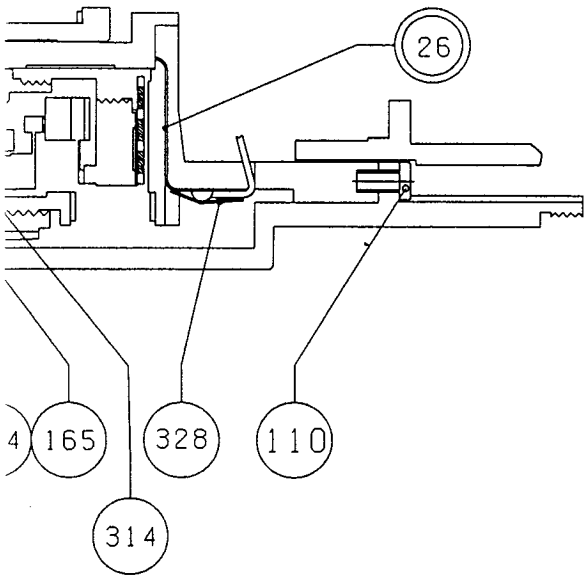



325
292
34
55
57
80
モミツケ
56
269
108
241
183
26
94
104
297
78
160
79
134
120
33
34
174
59
181
114
114
83
58
278
279
112
119
M.B.f.46.5
178
129
149
272
30
286
261
271
318
107
183
31
49
G10
G12
121
124
101
23
97
G11
G13
258
200
B.f.161.1
(フィルタを入れた状態で)
323
36
127
39
159
161
172
173
321
125
28
158
158
261
126
171
32
140
117
369
66
221
283
174
45
277
29
93
1
151
154
21
99
122
47
175
モミツケ

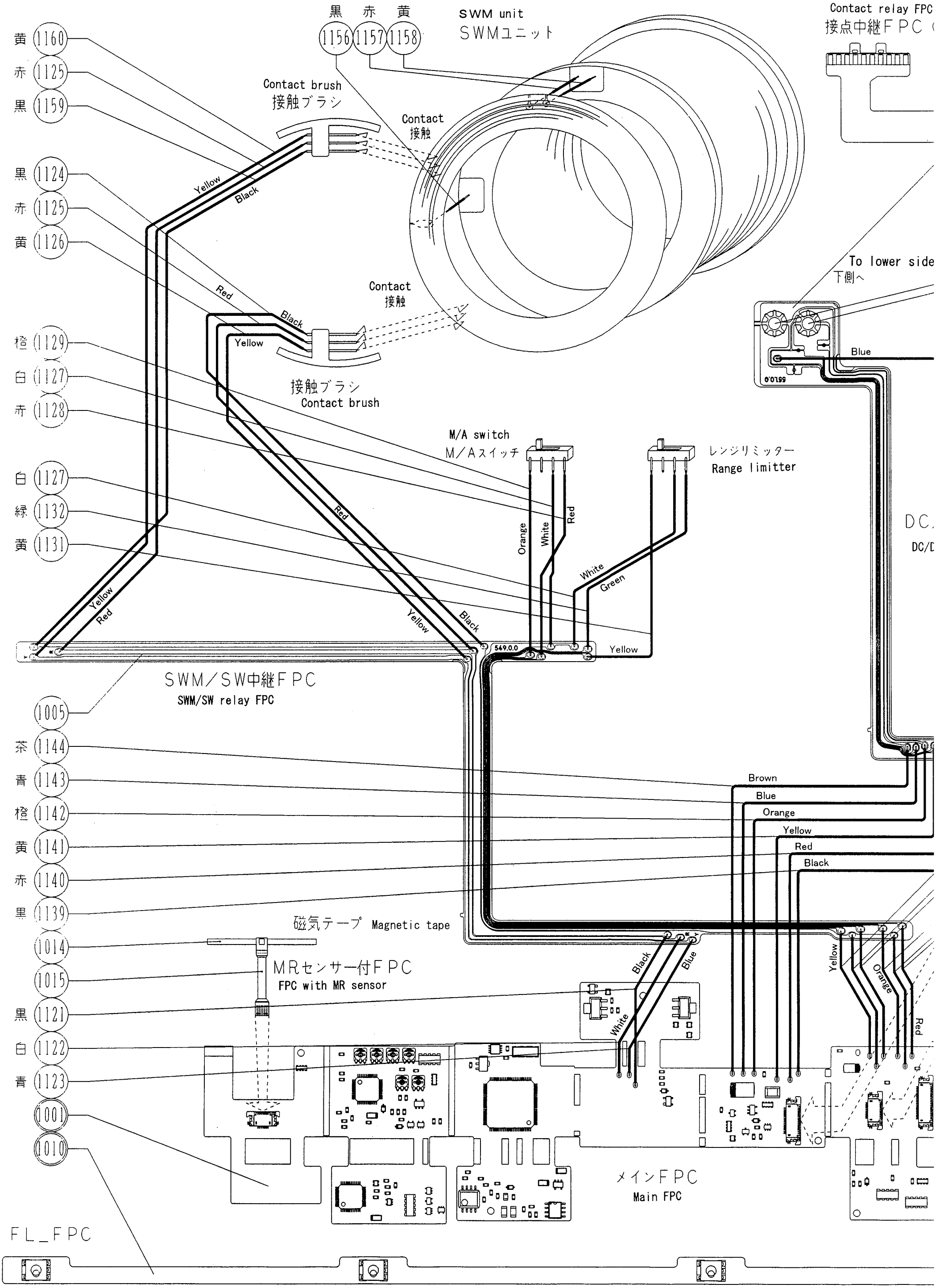
INC


207
85
87
148
144
91
146
84
86
142
141
92
147
114
0.5
(設計値)
143
95
50
24
53
25
319
320
202
289
114
155
60
62
152
311
68
22
153
163
162
239
294
244
243
192
240
24
213
88
2
34
315
164
165
177
211
312
169
179


1
146
133
92
147
133
160
21
81
281
109
103
166
111
90
77
23
143
95
31
0.5
(設計値)
62
152
191
63
162
203
79
27
96
32
28
27
310
180
98
1022
280
105
260
145


26
4
165
328
110
314

INC


黒 赤 黄
1156 1157 1158
SWM unit
SWMユニット
Contact relay FPC
接点中継FPC
黄 1160
赤 1125
黒 1159
Contact brush
接触ブラシ
Contact
接触
黒 1124
赤 1125
黄 1126
Yellow
Black
Red
Black
Yellow
Contact
接触
To lower side
下側へ
Blue
橙 1129
白 1127
赤 1128
接触ブラシ
Contact brush
M/A switch
M/Aスイッチ
レンジリミッター
Range limitter
白 1127
緑 1132
黄 1131
Red
Orange
White
Red
White
Green
Yellow
Red
Yellow
Black
549.0.0
Yellow
SWM/SW中継FPC
SWM/SW relay FPC
DC
DC/D
1005
茶 1144
青 1143
橙 1142
黄 1141
赤 1140
黒 1139
Brown
Blue
Orange
Yellow
Red
Black
磁気テープ Magnetic tape
1014
1015
黒 1121
白 1122
青 1123
MRセンサー付FPC
FPC with MR sensor
Black
Blue
White
Yellow
Orange
Red
1001
1010
メインFPC
Main FPC
FL_FPC

ay FPC (1)
PC (1)

青 茶 橙 黄 赤 黒

1007 1008 1006 1149 1150 1148 1018 1147 1146 1145

DC/DCコンバータ
DC/DC converter

Brown
Orange
Red
Red
Black

r side

上側へ

Blue

1137 黄
1136 白
1138 緑
1135 橙
1133 白
1134 赤
1155 橙
1154 白

Green
Orange
White
Red

White

M環検出
Rotation detector for manual focus ring

DC/DC中継FPC
DC/DC relay FPC

White

Orange

絶対距離中継FPC
Absolute focal distance FPC

291
1004
1151 黒
1009
1153 白
1152 茶

Black

Red

White

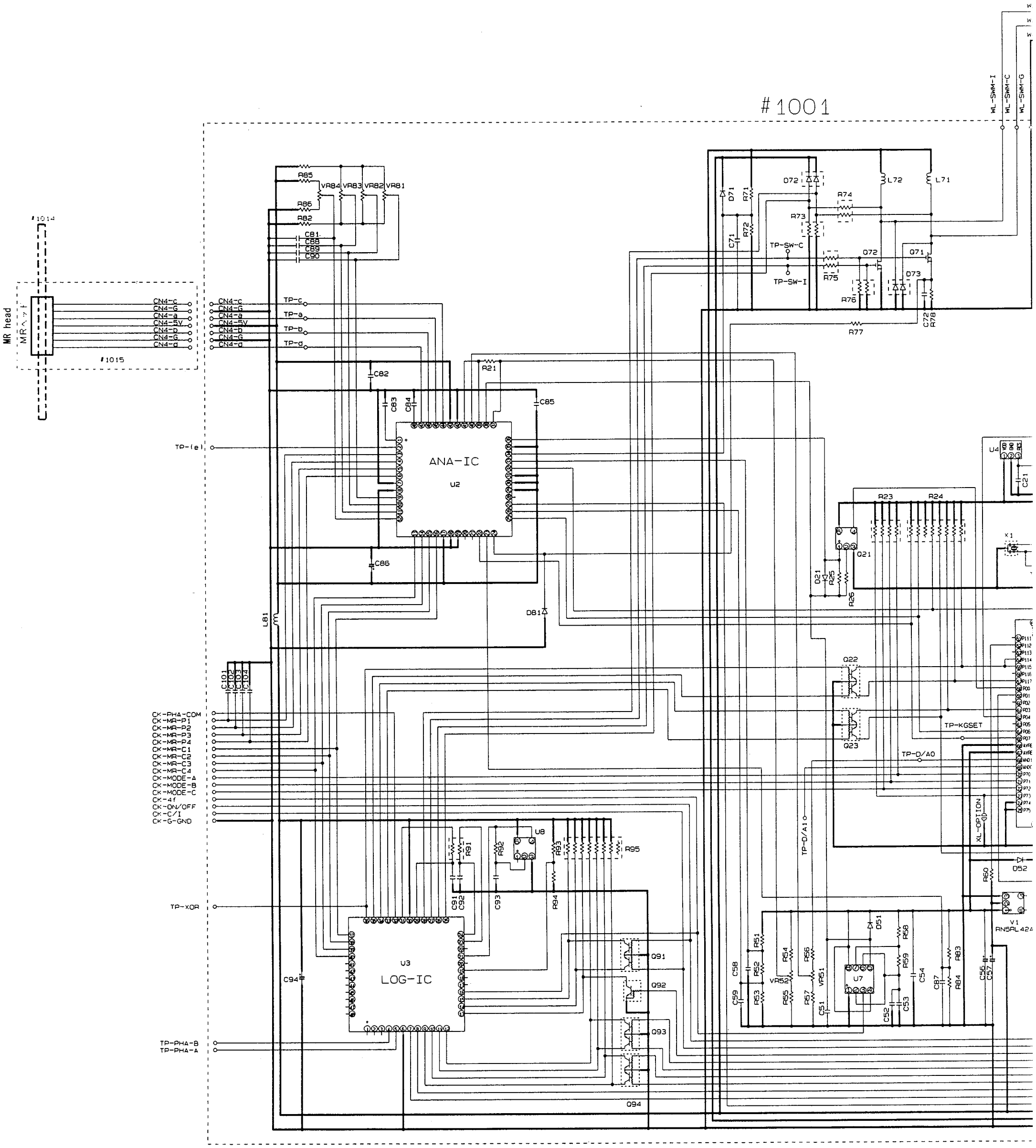
FL中継FPC
FL relay FPC

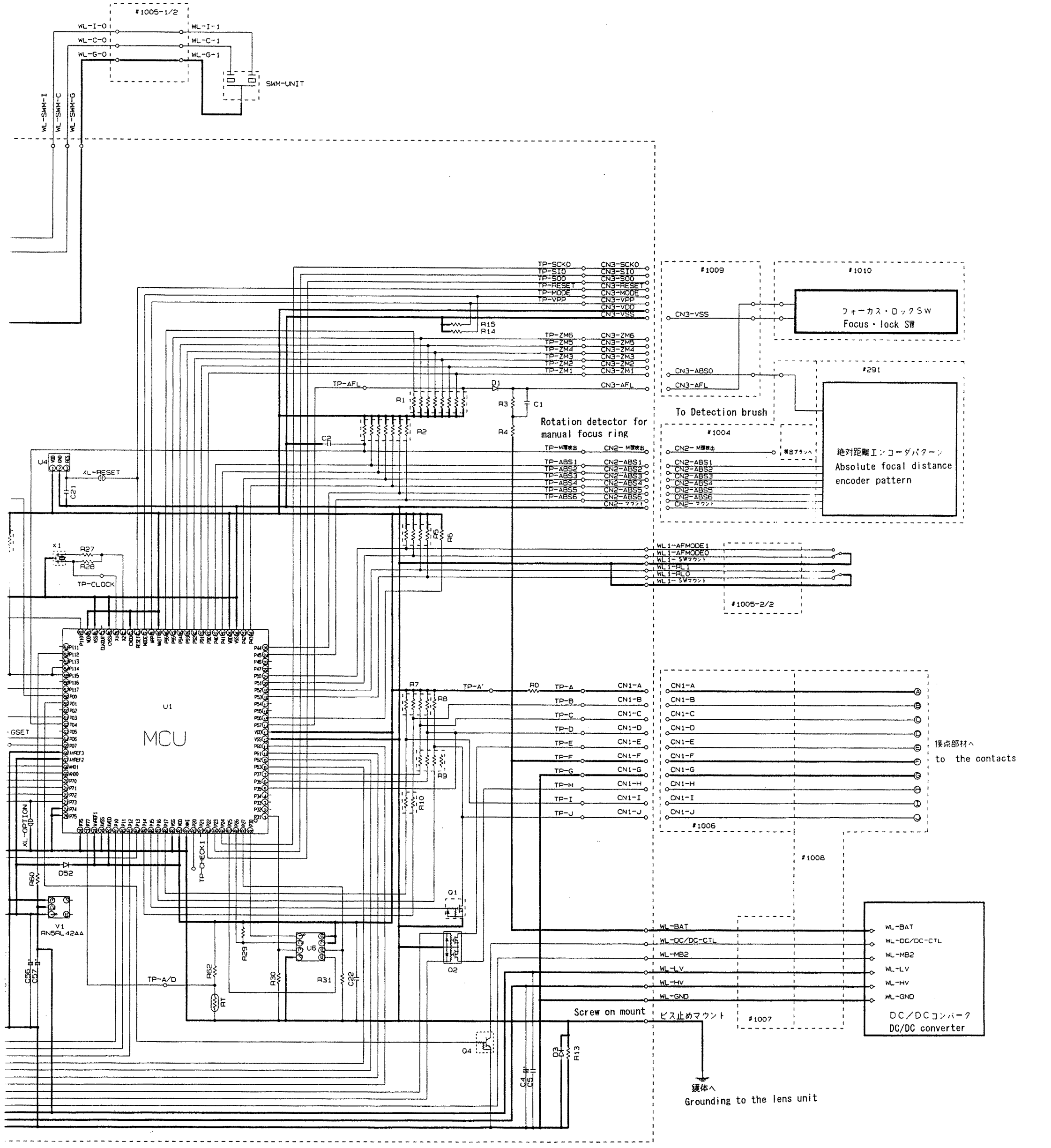
Brown
White

接点中継FPC (2)
Contact relay FPC (2)

実体配線図 WIRING

回路図　CIRCUIT DIAGRAM




#1005-1/2
WL-I-0
WL-C-0
WL-G-0
WL-I-1
WL-C-1
WL-G-1
SWM-UNIT
WL-SWM-I
WL-SWM-C
WL-SWM-G
TP-SCK0
TP-SI0
TP-SO0
TP-RESET
TP-MODE
TP-VPP
CN3-SCK0
CN3-SI0
CN3-SO0
CN3-RESET
CN3-MODE
CN3-VPP
CN3-VDD
CN3-VSS
#1009
#1010
CN3-VSS
フォーカス・ロックSW
Focus・lock SW
R15
R14
TP-ZM6
TP-ZM5
TP-ZM4
TP-ZM3
TP-ZM2
TP-ZM1
CN3-ZM6
CN3-ZM5
CN3-ZM4
CN3-ZM3
CN3-ZM2
CN3-ZM1
TP-AFL
CN3-AFL
CN3-ABS0
CN3-AFL
#291
D1
R1
R3
C1
R2
R4
C2
To Detection brush
#1004
Rotation detector for
manual focus ring
TP-M環検出
CN2-M環検出
CN2-M環検出
検出ブラシへ
TP-ABS1
TP-ABS2
TP-ABS3
TP-ABS4
TP-ABS5
TP-ABS6
CN2-ABS1
CN2-ABS2
CN2-ABS3
CN2-ABS4
CN2-ABS5
CN2-ABS6
CN2-アース
CN2-ABS1
CN2-ABS2
CN2-ABS3
CN2-ABS4
CN2-ABS5
CN2-ABS6
CN2-アース
絶対距離エンコーダパターン
Absolute focal distance
encoder pattern
U4
XL-RESET
C21
R5
R6
WL1-AFMODE1
WL1-AFMODE0
WL1-SWアース
WL1-RL1
WL1-RL0
WL1-SWアース
#1005-2/2
x1
R27
R28
TP-CLOCK
U1
MCU
R7
TP-A'
R0
TP-A
CN1-A
R8
TP-B
CN1-B
TP-C
CN1-C
TP-D
CN1-D
TP-E
CN1-E
TP-F
CN1-F
TP-G
CN1-G
TP-H
CN1-H
TP-I
CN1-I
TP-J
CN1-J
R9
R10
CN1-A
CN1-B
CN1-C
CN1-D
CN1-E
CN1-F
CN1-G
CN1-H
CN1-I
CN1-J
#1006
接点部材へ
to the contacts
XL-OPTION
D52
R60
V1
RN5RL42AA
TP-CHECK1
Q1
#1008
U5
R29
R30
R31
R62
C22
C56
C57
TP-A/D
AT
Q2
WL-BAT
WL-DC/DC-CTL
WL-MB2
WL-LV
WL-HV
WL-GND
WL-BAT
WL-DC/DC-CTL
WL-MB2
WL-LV
WL-HV
WL-GND
Screw on mount
ビス止めマウント
#1007
DC/DCコンバータ
DC/DC converter
Q4
D3
R13
C4
C5
鏡体へ
Grounding to the lens unit

AF－S500／4DⅡ　EEPROM

2001-6-25

Address	Contents	CPU			Others
		1.0 1.0 1			
0	Optional set value	0			
1	Data for controlling the lens	0			
2	Data for manufacturing processes	－			
3	Value for control and adjust for motor	－			
4	Data for controlling the lens	0			
5	〃	0			
6	〃	0			
7	〃	0			
8	〃	1			
9	〃	1			
1 0	〃	1			
1 1	〃	1			
1 2	〃	0			
1 3	Unused	－			
｜	｜	｜			
2 6	Unused	－			
2 7	Checksum data	－			
2 8	Data for controlling the lens	－			
｜	｜	｜			
1 2 7	Data for controlling the lens	－			

・Each 'value' explained here means the fixed value and the default value.
Of them, there are some changes according to the lens operational condition(s).

・The sign of 「－」 in the table above means a value which changes in accordance with the lens operational condition(s).